



Armed Forces College of Medicine AFCM



**Diseases of The lower
Respiratory System
&
Pathology of Chronic
Obstructive Pulmonary
Diseases (COPD-1)**
by
Prof. Omnia Kamel Rizk



Good Morning

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INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to:

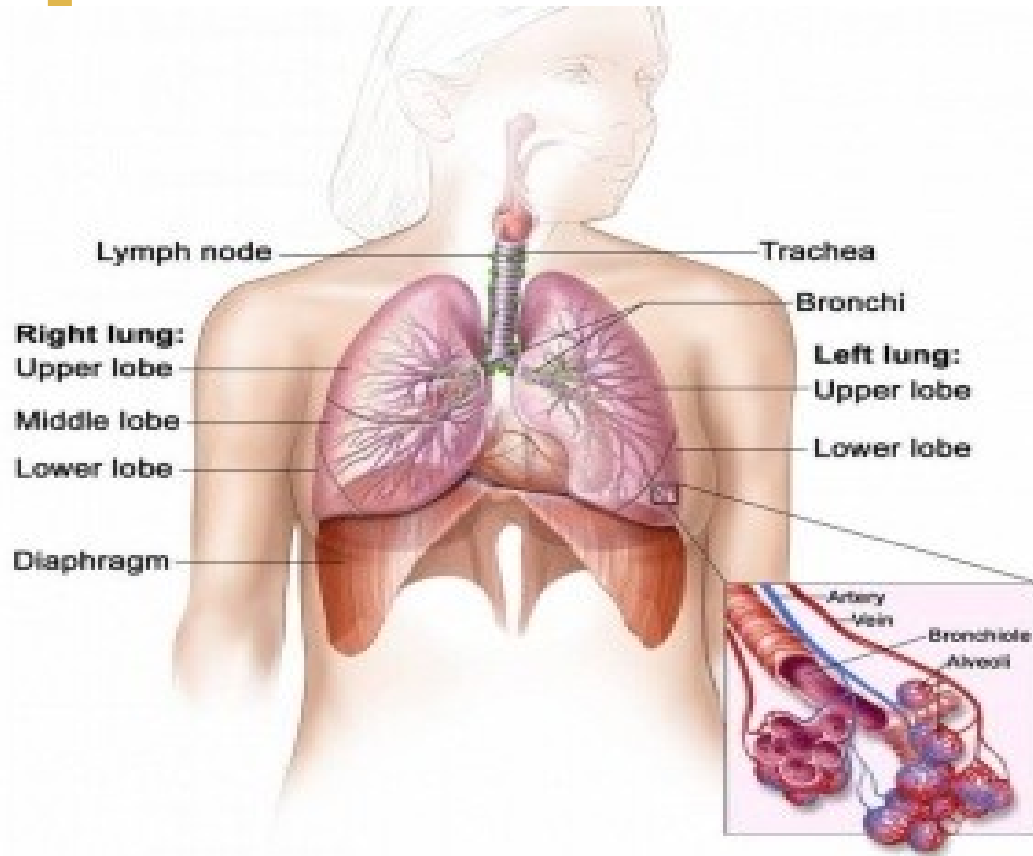
1. Determine causes of acute tracheobronchitis
2. Define Chronic obstructive pulmonary disease and chronic bronchitis
3. Discuss clinical picture and pathogenesis of chronic bronchitis.
4. Describe the gross and microscopic picture of chronic bronchitis.
5. Define bronchial asthma
6. Describe clinical pictures, types, and morphology of bronchial asthma.

Lecture Plan

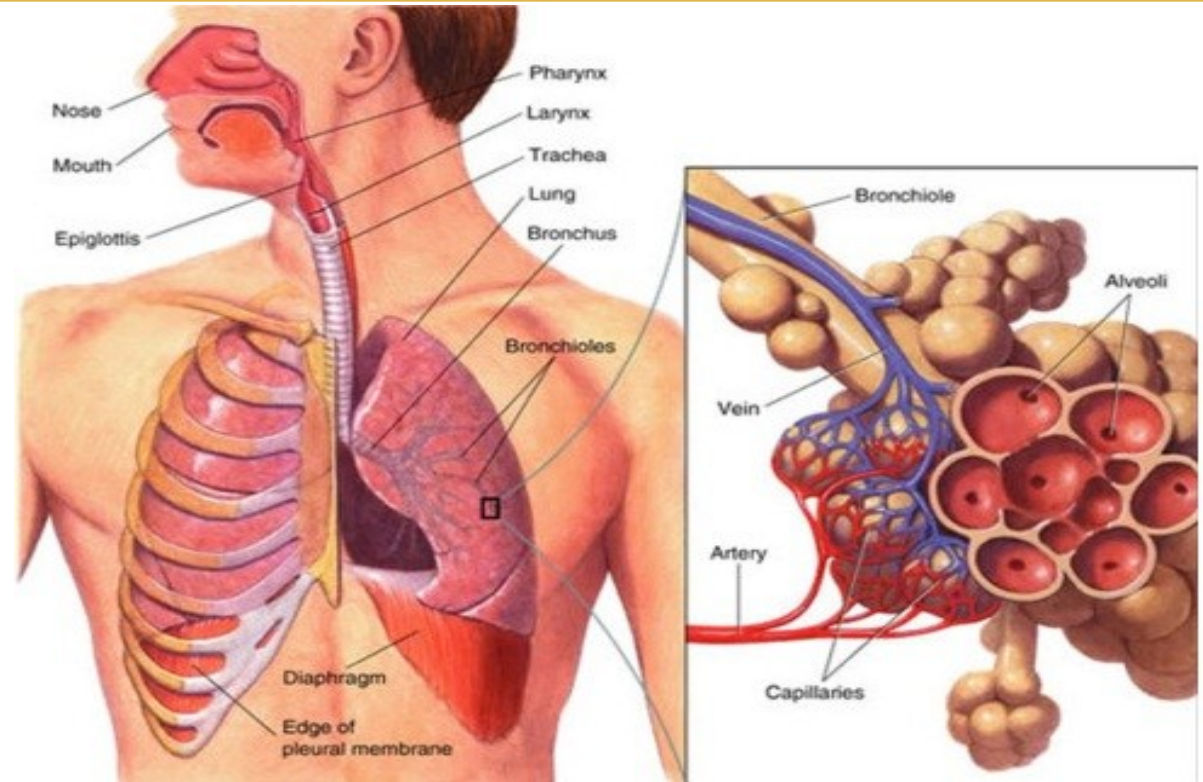


- 1. Part 1 (5 min) Introduction**
- 2. Part 2 (35 min) Main lecture:**
- 3. Part 3 (5 min) Summary**
- 4. Lecture Quiz (5 min)**

Diseases of the lower respiratory system



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Inflammatory Diseases



Acute tracheobronchitis:

Causes:

- It commonly complicates severe upper respiratory infection, particularly hemophilus influenza infection in children and adults.
- Viral tracheobronchitis may be complicated by bacterial infection, most commonly, staphylococcus aureus.
- Hypersensitivity
- Chemical and mechanical irritation.

Chronic Obstructive Pulmonary Disease (COPD)



Definition:

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory lung disease that causes obstructed airflow from the lungs.

Etiology:

The four prototypes of COPD are:

- a- Chronic bronchitis
- b- Bronchial asthma
- c- Emphysema
- d- Bronchiectasis

Chronic Obstructive Pulmonary Disease (COPD)



Symptoms:

Symptoms include *breathing difficulty, cough, mucus (sputum) production and wheezing.*

People with COPD are at increased risk of developing *heart disease, lung cancer and a variety of other conditions*

Chronic Obstructive Pulmonary Disease (COPD)



1- Chronic bronchitis:

Definition: the presence of productive cough for at least *3 successive months for 2 successive years.*

Etiology:

It is about 8-10 times more in cigarette smokers than in non-smokers

The inhalation of sulfur dioxide & pollutants predisposes to secondary bacterial infection with H. influenza, pneumococci & streptococcus.

Chronic bronchitis



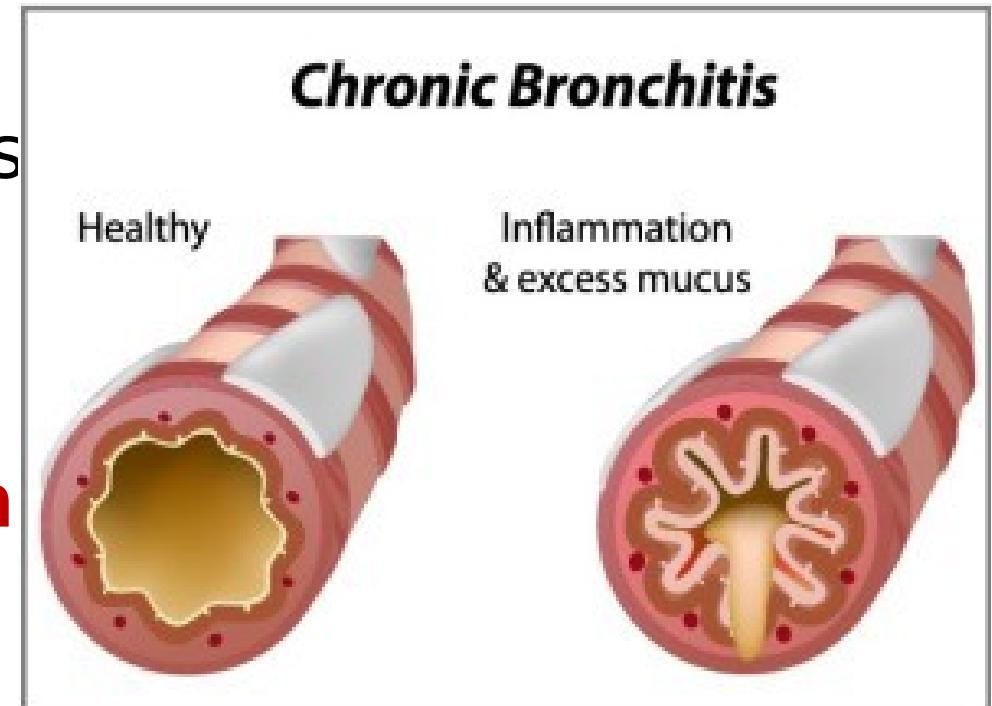
Clinical picture:

the patient is presented by fever, productive cough and purulent sputum.

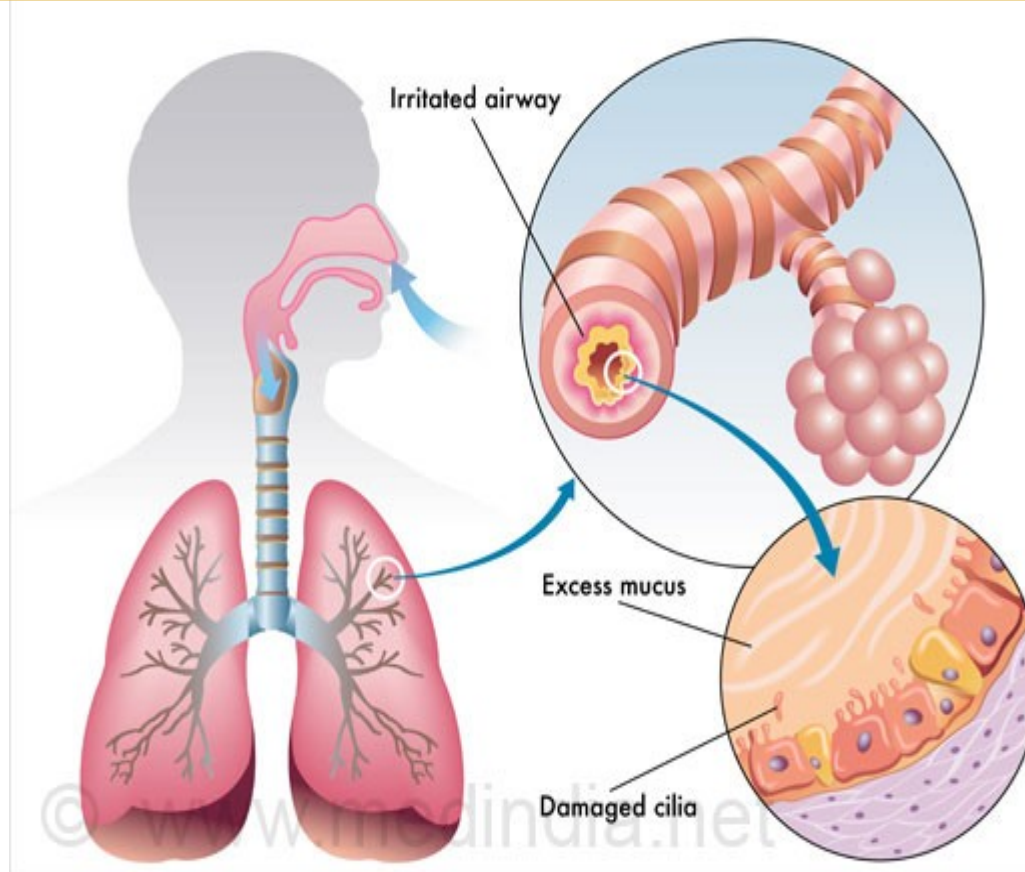
- In late stages the patient develops hyper responsive airways with bronchospasm and wheezing.

Heavy smokers usually develop **em**

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Chronic bronchitis



Chronic Bronchitis

is a type of chronic obstructive pulmonary disorder (COPD) that is characterized by a constant cough lasting for a few months. It also causes shortness of breath, wheezing, low grade fever and tightness of chest

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Chronic bronchitis



Pathogenesis :

Local irritation by cigarette smoke and air pollutants such as sulphur dioxide brings neutrophils , lymphocytes and macrophages to bronchial mucosa (in *contrast to bronchial asthma, there are **NO** eosinophils*). Tobacco smoking stimulates the secretion of neutrophil elastase (see emphysema).

Chronic bronchitis



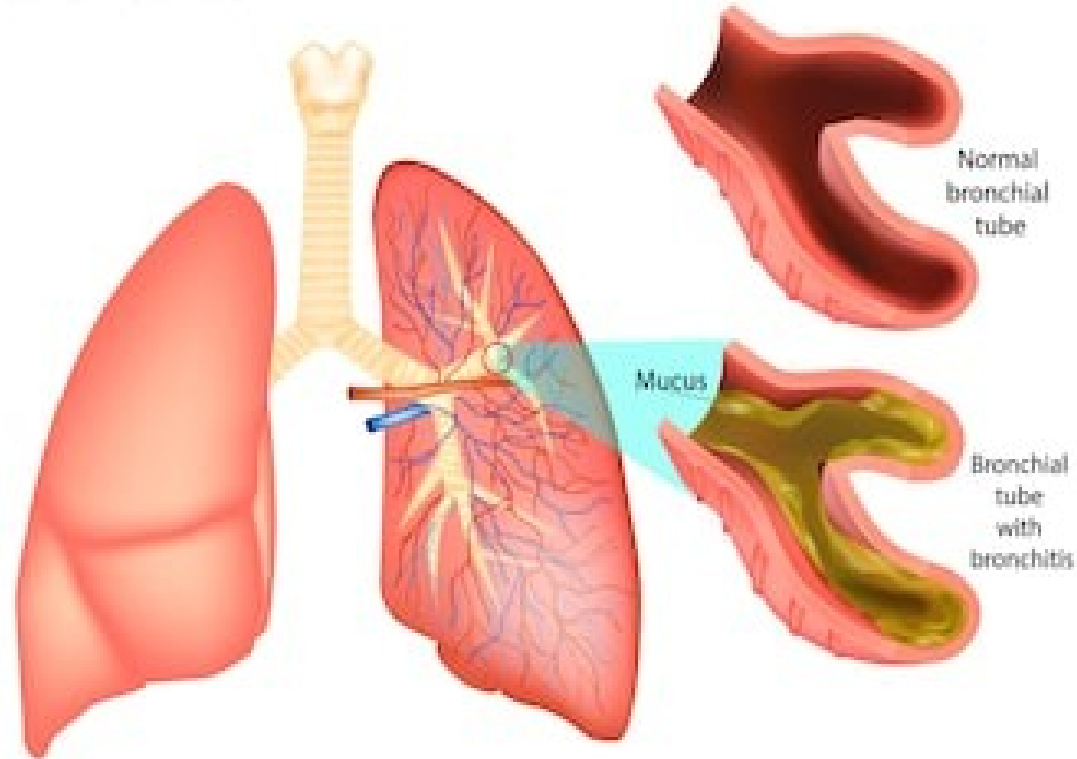
Pathogenesis :

- Increasing the size of mucous glands together with the number of mucous secreting goblet cells and this is the most distinctive feature of chronic bronchitis leading to **hypersecretion of mucous**.
- Edema and thickening of bronchial mucosa leads to retention of secretions and secondary bacterial growth.
- Persistent low grade inflammation of the bronchiolar wall which is replaced by fibrous tissue resulting finally in chronic obstruction pulmonary disease (COPD) and **emphysema** later in life in the fourth and fifth decades.

Chronic bronchitis

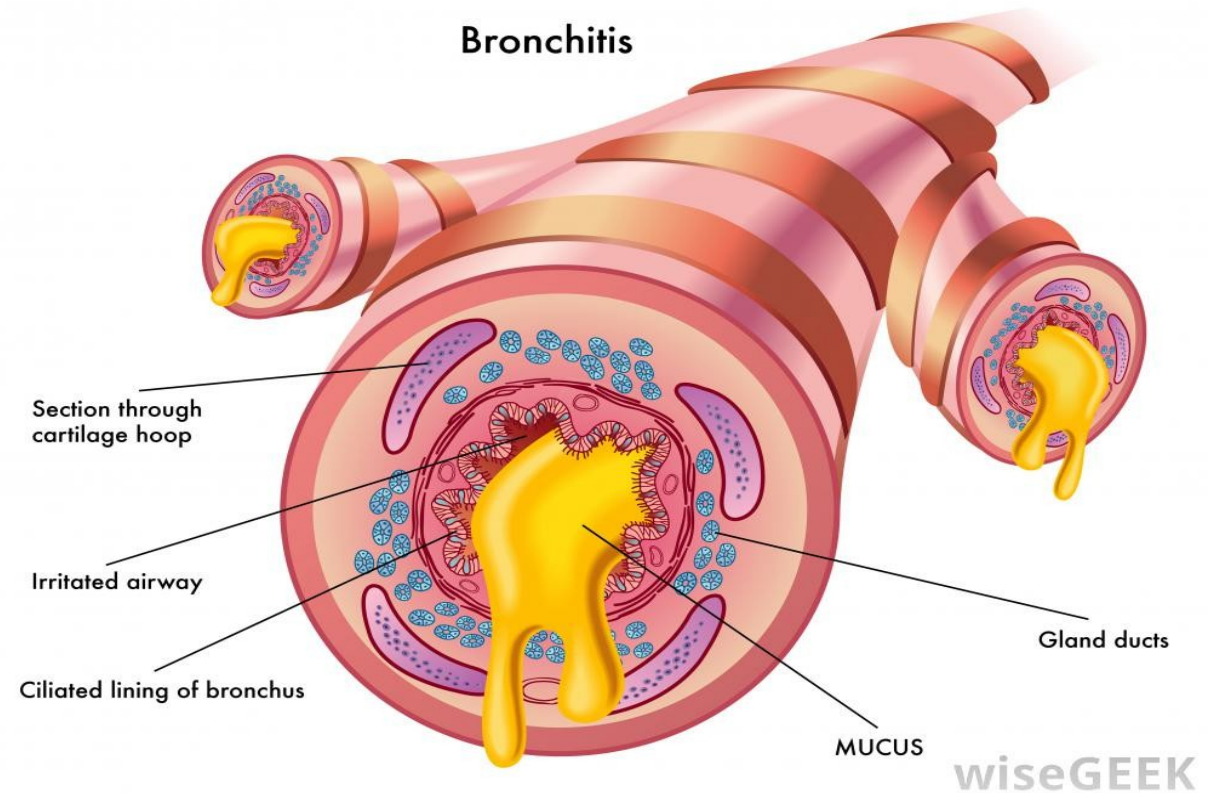


BRONCHITIS



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Bronchitis



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Chronic Obstructive Pulmonary Disease (COPD)



2. Bronchial Asthma:

Definition: repeated attacks of dyspnea due to attacks of increased responsiveness of the tracheobronchial tree to a variety of stimuli leading to bronchospasm (increasing resistance to air flow).



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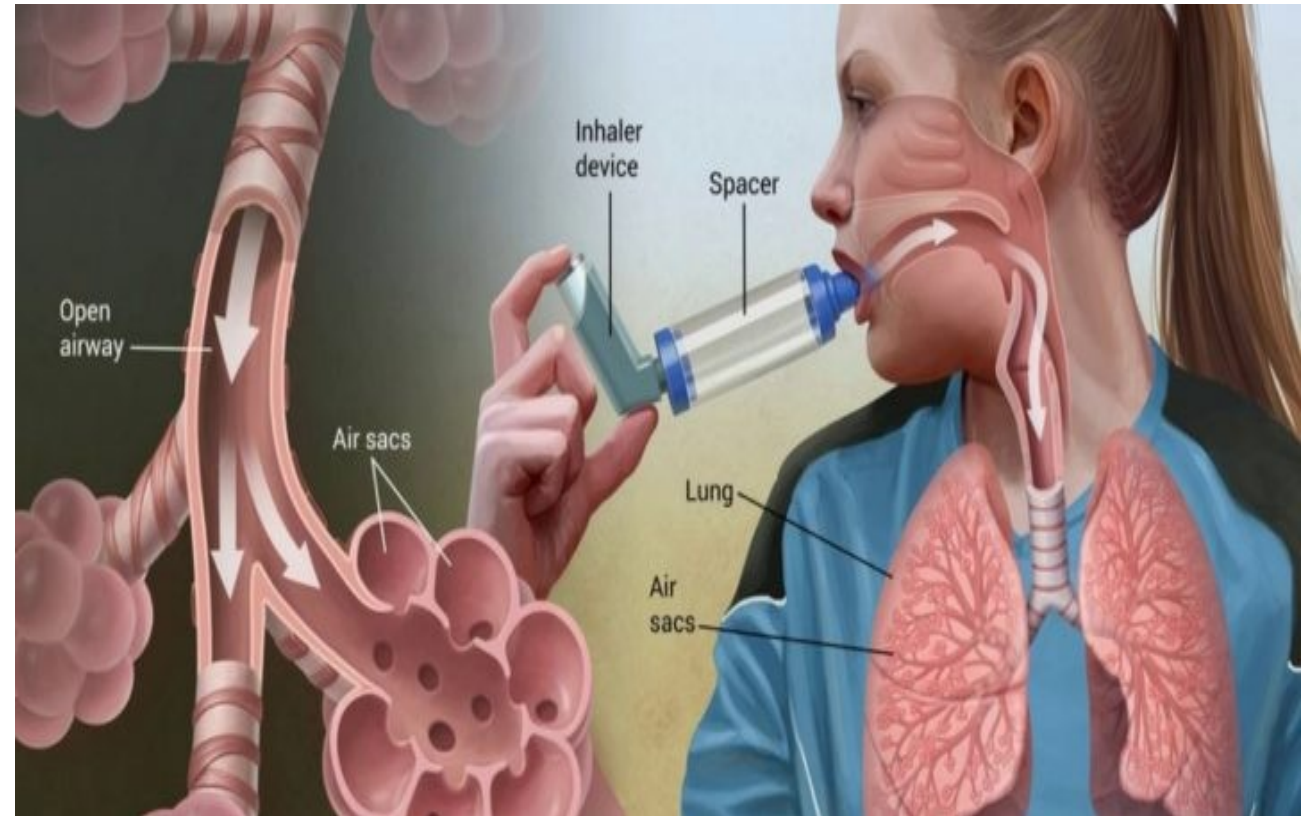
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Bronchial asthma



Clinical picture:

- a) Prolonged expiration
- b) High pitched wheeze.
- b) The attack is usually of short duration but rarely it may become severe and prolonged (*status asthmaticus*) which may lead to respiratory failure and even death.



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Bronchial asthma



Types:

Atopic (type I IgE-mediated hypersensitivity reaction) asthma
(most

common form) usually affects children and young adults. There is often a positive family history.

Nonatopic asthma is triggered by processes including respiratory infections

(usually viral), stress, exercise, or cold temperatures.

Drug-induced asthma affects about 10% of adults with a diagnosis of asthma. Aspirin is a key example of a precipitating drug.

Occupational asthma is caused by workplace triggers including fumes and dusts.

Bronchial asthma



Morphology:

- The lungs are over-inflated; with patchy atelectasis & occlusion of airways by mucous plugs.
- Microscopic examination of sputum cytology may shows:
 - a) Curschmann spirals** (twisted mucus plugs admixed with sloughed epithelium, eosinophils).
 - b) Charcot-Leyden crystals** (protein crystalloids from broken down eosinophils).

Bronchial asthma



a) Curschmann spirals



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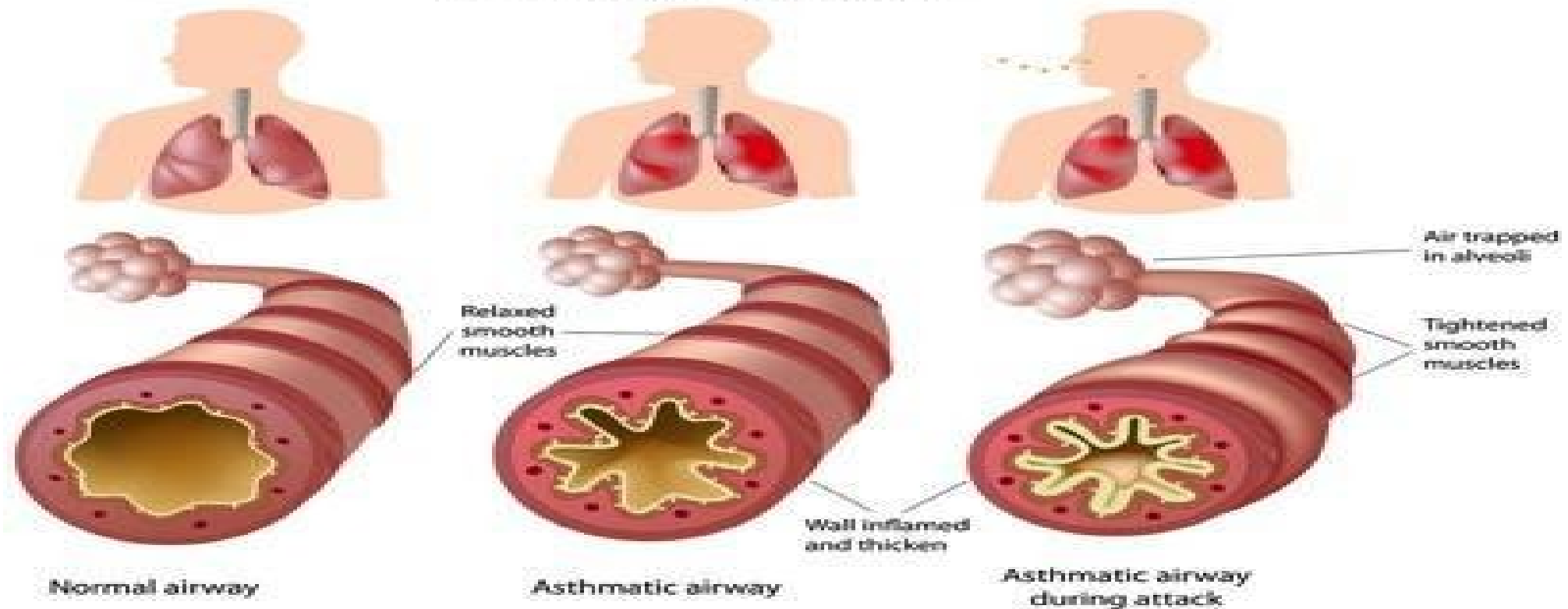
b) Charcot-Leyden crystals



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Bronchial asthma

Pathology of Asthma



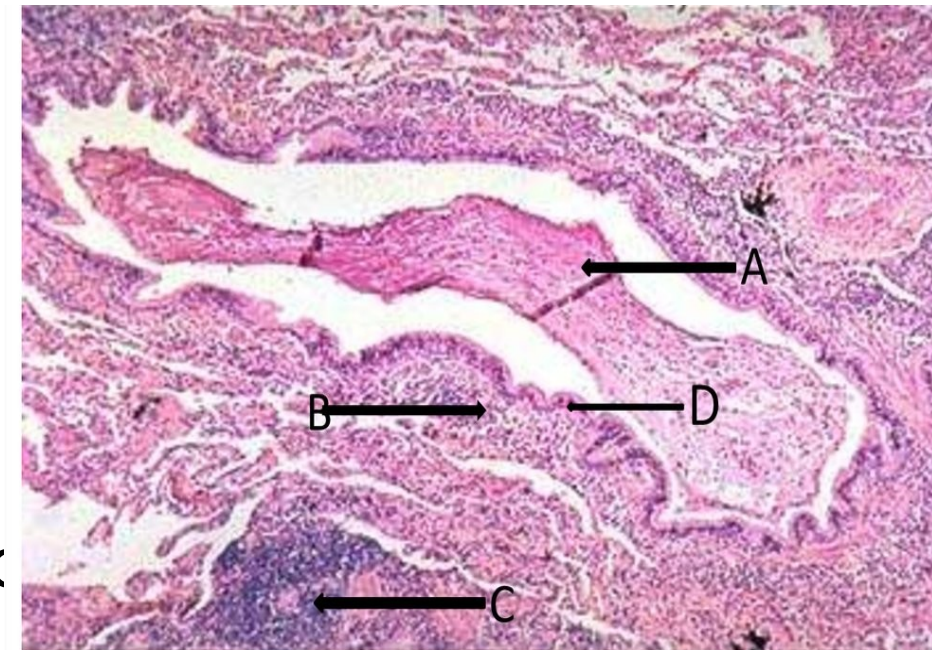
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Bronchial asthma



Microscopically;

- Thickening of the basement membrane of the bronchial epithelium.
- Edema and an inflammatory infiltrate in the bronchial walls, with a prominence of :
eosinophils and mast cells.
- An increase in the size of the submucosal glands.
- Hypertrophy of the bronchial wall muscle



A-mucous cork B-acute inflammation, C-chronic inflammation, D-epithelium of the bronchioles

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Curshman spirals are seen in:

- a- Chronic bronchitis
- b- Acute tracheobronchitis
- c- bronchial asthma
- d- Emphysema
- c- Bronchiectasis

Lecture Quiz



Fill in the space:

The disease is diagnosed as chronic bronchitis if there is chronic cough for successive Month, for successive years

SUGGESTED TEXTBOOKS



1- Kaplan Medical step 1, lecture notes in Pathology: Chapter 14, Respiratory system , pp. 125-143, 2017.

2- Hursh Mohan Text Book of Pathology, 7th ed. (2015): Chapter 14, Respiratory system, pp. 442-488.

3- Hursh Mohan Text Book of Pathology, 7th ed. (2015): Chapter 15, eye, ENT and neck, pp. 495-500

4- Robbins basic of Pathology, 10th ed. (2018): Chapter 13, Lung. pp. 495-549

